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THESIS FOR THE DEGREE OF M.D.

on

LEAD POISONING THE RESULT OF
TAKING DIACHYLON AS AN
ABORTIFACIENT

by

JOHN RUSSELL EDWARD, M.B., Ch.B.

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The sources of Lead Poisoning are many and varied. Mention is made in the writings of Galen of drinking water's acquiring harmful properties when conducted through lead pipes: this still remains one of the principal causes of lead poisoning, the other being working among lead or its salts. But in recent years another cause of lead poisoning has to be kept in mind, especially in certain districts, namely diachylon taken as an abortifacient.

The districts are chiefly those of Leicester, Birmingham, Nottingham and Sheffield.

The area over which the practice of using diachylon as an abortifacient has spread to the greatest extent, is bounded on the North by the upper part of South Yorkshire, on the South by Bedfordshire and on each side by the width of the counties of Leicester, Warwickshire, Notts and East Derbyshire (12)

The first cases reported occurred in Leicester in 1893 (1). The next cases reported occurred in Birmingham in 1898 (11). Another case was reported in Birmingham in 1899 (13).

In 1900 Dr. Ransom reported several cases (14 and 15). In 1901 Wrangham published several cases (16). In 1902 Scott published a number of cases (17 and 3). In 1903 Jacob reported 18 cases (19) and/

and later in the same year Layton reported a case (20). In 1905, 30 cases of plumbism due to the taking of lead as an abortifacient were published by Hall (21). In the same year Dr. Gill of Belper called attention to the prevalence of diachylon poisoning (22). In 1906 a case was reported by Dr. A. St. Lawrence Burke of Dudley (23). In the same year Wrangham reported a case in North West London (24) and Jollye one in Hampshire (25).

The same year the British Medical Journal had a leading article on Diachylon as an abortifacient (26). In this article the statement is made that "cases of poisoning from diachylon occurring in the course of a year are to be numbered by hundreds."

In the same year there is a report of a case of hydrocephalus in a foetus after diachylon had been taken to produce abortion (27). The report is by Jacob, Heelis and Trotman and two cases of diachylon poisoning are reported by Little of Leeds (28).

In the British Medical Journal of February 1906 there is a letter by W. H. Rowthorn of Rotherham calling attention to the prevalence of lead poisoning the result of taking lead as an abortifacient (29)

In March 1906 an inquest was held in Sheffield on the body of a woman who died from convulsions brought about by lead poisoning and the jury attached to/

to its verdict the following rider and requested the coroner to forward it to the home Office.-"That the indiscriminate use of diachylon is dangerous and leads to most serious injury to life and health and strongly suggests that it should be placed in the schedule of poisons and subjected to the restrictions thereof." (30).

In July 1906 a Mrs. Wardle of Nottingham was sentenced to 18 months hard labour for selling diachylon pills to produce abortion (31).

On October 30th 1906 Mr. Samuel Roberts asked the Secretary of State for the Home Department whether his attention had been called to the cases of two women tried and found guilty of supplying dangerous pills containing diachylon, at the Sheffield Quarter Sessions on October 24th and sentenced to 12 and 6 months imprisonment with hard labour; and whether considering the increasing use of diachylon by women for certain purposes, he could see his way to have this drug and its preparations scheduled as a poison.

Mr. Herbert Gladstone said he was informed that the Lord President of the Council had advised that to schedule diachylon as a poison would entail great inconvenience without attaining the object desired. It was hoped that the conviction at Sheffield would serve as a deterrent. Mr. Roberts asked if the increase/

increase in the use of the drug had been taken into consideration. Mr. Gladstone replied in the affirmative, adding that it was a very difficult question (32).

In November 1906 a case is reported by F. W. Hope Robson of Southampton (33).

In an article in the Lancet of December 1906 on "Abortion feloniously induced by diachylon," it is stated that a woman named Turner was sentenced at Leicester to 12 months hard labour for the above offence (34).

There are four forms of lead poisoning usually described (2). In the first variety colic is the most important symptom. In the second the central nervous system is profoundly affected (lead encephalopathy). The third is the neuro-muscular form. The fourth includes those cases characterised by profound cachexia.

In diachylon poisoning the cases usually belong to the first two types. In only one case out of between 70 and 80 which I have seen during the six years I have been at the General Hospital, Nottingham, was the neuro-muscular type present, though general muscular weakness is a common condition.

Symptoms. Abdominal colic is one of the earliest symptoms/

symptoms or the patient may have been conscious of loss of appetite and of a disagreeable taste in the mouth in the morning. As a rule the colic is severe and recurrent and is often associated with retraction of the abdomen. Usually there is obstinate constipation, but not infrequently there is diarrhoea. The pain of lead colic has a double character: it is paroxysmal, or it is constant or more of a dull aching. Days after the superficial or paroxysmal pain has subsided, deep pressure upon the abdomen elicits signs of suffering and the peculiarity of this pain and sometimes too of the colic, is that it is either limited to one side entirely, or is more acutely felt on pressure on one side than the other (2). It is said that when pressure is applied to the corresponding side of the neck along the course of the vagus a little above the sternoclavicular articulation considerable pain is experienced. This symptom I have very rarely found present though I have examined every case for it. The pupils are sometimes unequal and the pupil on the same side as the abdominal pain is usually smaller.

The pulses at the wrists are unequal, the pulse on the same side as the colic is sometimes weaker, sometimes stronger.

Colic may never appear during the whole course of the/

of the illness. Vomiting is a not infrequent symptom. Headache is commonly present. Epileptiform seizures with loss of consciousness are frequently present in the more severe cases. Some of the cases at first are hysterical then convulsions follow. When the convulsions subside the patient may remain restless and delirious for a time, then later she may become melancholic.

Eye symptoms. Blindness which has developed suddenly, accompanies headache, it may be complete or incomplete, this form is always transient and is evidently due to a toxaemic condition of the central or deeper parts of the brain concerned in vision or upon an anaesthetic state of the retina for on ophthalmoscopic examination the fundi are found to be normal. The loss of sight is intermittent and may return at any time (5).

In other cases the loss of sight is due to neuro-retinitis. The discs are swollen, ill-defined and irregular, hyperaemic and mottled, the vessels are obscured or if observable they are narrowed and have delicate white lines running along their border (2). The veins are distended and haemorrhages in the retina are not uncommon. This form is usually associated with epileptiform seizures and is usually followed by atrophy./

atrophy.

Dr. C. B. Taylor reported a case of saturnine amblyopia in a girl who had been taking 10 grain doses of emplast. plumb. nightly for three weeks. There was white atrophy of the left optic disc and marked central scotoma in both eyes notwithstanding that the right papilla was apparently normal (amblyopia without tissue change). In this case there was no colic, lead line on the gums, palsy or wrist drop (6).

One of the most important signs of lead poisoning is the blue line in the gums, along the margins close to the teeth. This line is absent if the teeth have fallen out and its appearance is greatly retarded by the use of the tooth brush. Running up between the teeth may be seen small pyramidal masses of gum with well-defined blue margins. In lead workers the line may be present for months though they may not be suffering from lead poisoning. Its persistence, however, is an indication of the presence of lead in the system. The presence of bad teeth, ulcerated gums and want of cleanliness favour the establishment of the line.

The shortest times in which it has been observed to disappear are from two weeks to four months (2).

On/

On other portions of the mucous membrane of the mouth bluish black patches are sometimes seen, the most frequent spot in my experience is about half an inch from the angle of the mouth and on the same level. In one of my cases (Case V.) there were several blue black dots in the tongue.

On microscopical examination of the gums black granules of sulphide of lead are observed in the deeper cells of the epidermis (2).

The symptoms in diachylon poisoning do not differ greatly from those produced by other forms of the poison except that generally the symptoms are more acute in their onset in the case of diachylon.

The diagnosis of lead poisoning is as a rule easy in those cases resulting from water or food supply, or from the occupation of the patient, but in diachylon cases the diagnosis is often difficult as a history is often not obtainable, owing to the patient's condition or the patient frequently tries to mislead the physician.

It has to be borne in mind that the symptoms of lead poisoning may precede the appearance of the blue line and this seems to be the case particularly in lead poisoning due to diachylon.

Condition of the Blood. In addition to anaemia which may be/

may be slight or severe, a condition of granular degeneration of the red blood corpuscles is present (8 and 4).

The method of staining the blood films recommended by Professor Grawitz is as follows. The drop of blood spread in the usual way in a very fine film upon the coverglass is allowed to dry in the air, it is then fixed in 99 per cent alcohol. After this a basic dye such as methyl blue or haematoxylin is used either alone or in combination with an acid counterstain. In the latter case an eosin haematoxylin or an eosin methyl blue solution is used. The affected red cells appear in these specimens full of very fine dark blue points, these granules are found not only in the normal cells but also in the megalocytes, microcytes, and poikilocytes and they occur not infrequently in the nucleated red corpuscles. Grawitz believes granular degeneration takes place in the red cells of the circulating blood through the influence of different blood poisons also that in no illness do these granule cells play so important a diagnostic and prognostic role as in lead poisoning. He also showed that the granule cells are seen in the blood of those affected with lead poisoning even when no other morphological change can be found in the blood and when no other symptom of lead poisoning is noticeable/

noticeable. He mentions a case of a painter with colicky pains with a blue line on the gums but the patient had not used lead paint for six weeks: blood examination for granule cells gave a negative result and it became evident on more detailed examination it was not lead colic, but dilatation of the stomach.

White and Pepper (9) came to the conclusion that these granules are a constant finding in cases of lead poisoning and appear very early in cases under the influence of lead salts long before subjective or other objective symptoms can be demonstrated.

Stengel, White and Pepper (10) found the granules frequently in chlorosis, constantly in advanced cases of pernicious anaemia and in leukaemia.

In the 34 following cases they found granular erythrocytes; typhoid fever 3 cases, valvular heart disease 3, peritonitis 3, septicaemia 3, tubercular arthritis 2, malaria 2, pertussis, heart disease and nephritis, lobar pneumonia and pleurisy, phthisis, malignant endocarditis, aneurism and nephritis, nephritis and anaemia, splenic anaemia, secondary anaemia, pseudo-leukaemia, chronic diarrhoea, phlyctenular conjunctivitis, orchitis, carcinoma of the stomach, lymphoma of neck, sarcoma of neck, empyaema, osteomyelitis each one case.

"With/

"With the single exception of lead poisoning no condition that we know of regularly causes this change though other conditions operate to this end in occasional cases."

Moritz (35) demonstrated the granules in rabbits after the administration of lead pills and also after the administration of pyrocin subcutaneously. He also found the granules in two cases of leukaemia, in malaria, sepsis and carcinoma.

Nutt (4) found basophilic granular erythrocytes in the blood vessels of all his cases also that the granules disappear as convalescence is established and their number in the blood stream is an indication of the severity of the intoxication. Nutt found that the percentage of granular red cells varies from 6 per cent to .3 per cent.

I have examined the blood for granular red cells in six cases of diachylon poisoning and in all the granules were present. In five of these cases the granules were scanty and the degree of poisoning slight. In one case (Case No.VI) the granules were well marked and the case a severe one.

Although the pallor in diachylon poisoning is very marked in a great many cases, in my experience, the anaemia as estimated by the blood count and percentage of/

of haemoglobin is less than one would expect from the degree of pallor. The pallor is said to be due not so much to the anaemia, but to the degeneration and clumping of the haemoglobin in the red cells. (4)

The tests for lead in the urine are not much use clinically. One of these tests is to evaporate the urine to dryness, apply tests to a solution made of the residue. This test is trustworthy if a sufficient quantity of the urine is taken (3).

Another test is to place a strip of magnesium in the fluid to be examined. Ammonium oxalate in the proportion of 1 gramme to 150 c.c. is added. If lead is present it is deposited on the magnesium. The strip is then washed with distilled water and dried. In order to confirm the test (a) warm the strip with a crystal of iodine upon it; yellow iodide proves the existence of lead - the probability of its being cadmium need scarcely be entertained: (b) dissolve the deposit in nitric acid and apply the usual tests for lead. This test is capable of detecting 1 part of lead in 50,000 whether the metal be dissolved in water or contained in an organic fluid like urine (2). A positive result was not obtained with this test in several cases of undoubted diachylon poisoning examined by Dr. Scott and myself.

In those cases of lead poisoning which end fatally the morbid anatomy is practically nil (5). After death from lead encephalopathy beyond the brain being found shrunken, firm and dry or extremely pale and watery/

and watery as in uraemic poisoning the cerebrum may present nothing unusual. Lead may be detected in the brain but in some cases it is absent. Lead is also found in the liver, kidneys and bones never in the blood serum. The small intestine in places is occasionally extremely contracted.

The kidneys on microscopical examination present the appearances met with in early parenchymatous nephritis, cloudy and fatty changes in the renal epithelia accompanied in more chronic cases by evidence of interstitial and glomerular nephritis.

Treatment. For the constipation and colic Magnesium Sulphate is the usual treatment, usually 20 to 30 grains or more thrice daily with 5 to 10 grains of Potassium Iodide. It is generally stated that Iodide of Potassium has to be used with caution because in a quiescent case of plumbism alarming symptoms may develop when Potassium Iodide is given owing to the drug's rendering soluble lead which had been deposited in the tissues. There must be some difference of opinion on this point, as in the Report of the Royal Academy of Medicine in Ireland (7), the president of the Medical Section says, - "Iodide of Potassium does no real harm by increasing the solubility of lead already deposited in the system. The quantity is very small and the increased quantity in solution for a couple of days would not signify.

Lead/

Lead is not excreted by the kidneys to any practicable extent, but it is excreted by the intestines and it is very liable to be reabsorbed. Consequently it is always well to combine with the Iodide of Potassium a saline purgative such as Magnesium Sulphate."

In an article on Insanity in Lead Workers by Jones, (18) it is stated that Dr. MacDowall of Newcastle reported that experience had taught him that if Iodide of Potassium were given in very severe cases the patient would pass into a state of coma and die quickly.

In the cases of diachylon poisoning I have observed, I have not seen Potassium Iodide produce any increase in the symptoms, but it must be added that in the most severe cases the patients have not had Potassium Iodide to begin with.

Frequently after Potassium Iodide has been given for some time the pulse tension becomes very low and the patient is at a standstill, in these cases it is a good plan to stop the Iodide and give Digitalis 5 to 10 minims thrice daily. I have several times seen marked improvement follow the administration of Digitalis.

Monosulphite of Soda is recommended in 5 to 10 grain doses thrice daily as a calmative for colic and as/

as an eliminator of lead (5).

For the convulsions nitrite of amyl inhalations are of great service.

Tapping of the lumbar region of the spinal cord in the coma of lead poisoning is recommended, but I have had no experience of it.

CASE I. M. M. Age 27. Married.

Admitted to the General Hospital, Nottingham, Oct. 24th 1904, complaining of sickness and pains in the abdomen.

PREVIOUS HEALTH. Typhoid Fever two years ago. Has cough every winter. Influenza six months ago. Generally suffers from "Indigestion and Headaches." Patient has had two children, the second 15 months ago.

FAMILY HISTORY. Nothing of Importance.

PRESENT ILLNESS. Six months ago patient had a miscarriage at the 6th week. The first thing complained of was pain in the head and throat, this lasted for three or four weeks, then improved, but she felt very weak and at times could scarcely see. For the first three months after the mis-carriage she was able to get about but during the second three months she has mostly been confined to bed. For the last month she has suffered from "gnawing" pain in the abdomen, especially in the upper half, also a feeling of nausea and vomiting, the vomiting coming on almost immediately after food. At first the vomiting was not severe but later came on even after a little milk. She has also been sleeping badly. The bowels have been regular and menstruation has been regular since the miscarriage. She/

She admits taking diachylon to bring on menstruation.

PRESENT STATE. Patient is very thin and pale, with a faint yellowish complexion. The lips present a slight fine tremor as does also the tongue which is coated with a dense white fur.

Teeth are bad and there is a characteristic blue - black line in the gums opposite several of the upper and lower teeth.

Pulse 64, regular, volume small, tension moderate.

The heart and lungs are normal to examination.

Abdomen. The upper half of the abdomen is retracted and moves little and is tender on palpation. The lower half moves more and is less tender.

There is no enlargement of the liver or spleen and no dilatation of the stomach made out.

Pupils are equal and of moderate size, react well to light and accomodation. There is paresis of the left external rectus.

Both optic discs are swollen, irregular and red, this condition being more marked in the left.

Patient is very dull and apathetic; at times complains a great deal of headache.

TREATMENT. Patient was put on ordinary diet; vomited a little for the first few days, but not afterwards/

afterwards. Had Pot. Iod. gr. V. and Magn. Sulph. gr. XX at first but after four days the Magn. Sulph. was increased to gr. LXX.

The abdominal pain soon subsided and the headaches became much less severe. The swelling and redness of the optic discs diminished and the sight improved so much so that when she left the Hospital $4\frac{1}{2}$ weeks after admission there was very little impairment of vision.

The paresis of the external rectus was very slight and two weeks after patient's discharge could scarcely be detected.

Patient gained four pounds in weight and was altogether much healthier looking.

The urine was free from albumin throughout.

CASE II. F. H. Age 24. Single.

Admitted to the General Hospital, Nottingham.

April 10th 1906, in a maniacal condition.

PREVIOUS HEALTH. Always been good. No history of any illness.

FAMILY HISTORY. Nothing of importance.

PRESENT ILLNESS. Five months before admission

patient missed one period, thought she was pregnant and took a "pennyworth" of diachylon which she was told about by a friend. A fortnight later she/

she began to suffer from headache, sickness and pain in the abdomen. She consulted a Doctor, who detected a characteristic blue black line in the gums and treated her for lead poisoning. The condition improved till about a week before admission. Menstruation had been regular after the one period missed, and there was no history of anything of the nature of an abortion having occurred. A week before admission the headaches became more severe and patient had to stop work for three days. On the fourth day she went to work as she felt a little better but while at work she suddenly became unconscious and remained so for two days; during this time the motions and urine were passed under her. Consciousness returned at the end of the second day and then she became violently delirious, shouted and screamed, constantly tried to get out of bed and had to be held down.

PRESENT STATE. Patient is very excited, does not understand anything said to her, very restless and always trying to get out of bed. Face is flushed; she is not anaemic, but is well nourished and healthy looking. Tongue is dry and slightly furred. Teeth moderately good./

good.

In the margin of the gums there is a well marked blue black line.

Pupils are equal and react well to light and to accomodation.

No paralysis of any of the eye muscles.

Fundi, both discs are slightly swollen, red and irregular at the margins.

No paralysis of any of the muscles of the limbs made out.

Pulse 96, regular, volume fair, tension moderate.

The Heart and Lungs are normal to examination.

The Abdomen is slightly rigid but otherwise nothing abnormal made out.

The urine contains a trace of albumin, but no tube casts.

TREATMENT. Patient was kept on milk diet and given Pot. Iod. gr. V. and Magn. Sulph. gr. XV. thrice daily. An occasional hypodermic injection of Morphia gr. $\frac{1}{6}$ was necessary at first, but in two days patient began to quieten and afterwards improved rapidly. Mental condition became much brighter but at the end of three weeks there was still some impairment of the mental faculties. The condition of the fundi remained about the same for about a month but later the swelling and indistinctness became much less and patient says she can/

she can see almost as well now as before her illness and her mental condition is now quite normal. The albumin in the urine persisted for a month, then disappeared.

CASE III. S.C. Age 30. Married.

Admitted to the General Hospital, Nottingham. 4th October 1907, complaining of griping pains in the stomach, vomiting, constipation and headache.

PREVIOUS HEALTH. Always been good, no history of any illness. Has two children alive and well.

FAMILY HISTORY. Nothing of importance.

PRESENT ILLNESS. Two months before admission patient having gone six weeks without menstruating, took a "pennyworth" of diachylon which she made into pills, usually she took about four daily for two weeks: at the end of two weeks she had a miscarriage and at the same time began to suffer from severe griping pains all over the abdomen. At first she was able to get about and attend to her household duties but at the end of a fortnight had to go to bed, where she remained till admission. At the same time as the pains in the abdomen came on she began to suffer from severe pains in the legs/

legs and feet, these pains were relieved by rubbing. Accompanying the abdominal pain there was constipation, for nine days before admission the bowels had not been opened and for a week before admission she vomited after every feed of milk, the vomiting coming on almost immediately. She also complained of intense headache and inability to sleep. There was no history of fits or loss of consciousness and no change in the eyesight had been noticed. She was sent in with a diagnosis of pelvic peritonitis.

PRESENT STATE. Patient is a well nourished, rather stout woman, with a considerable degree of anaemia. The complexion has a yellowish tint and the conjunctivae are slightly jaundiced. There is slight fine tremor of the lips, tongue and hands. The tongue is dry and coated with brown fur. The teeth are bad and along the margin of the gums there is an intense blue black line. The pupils are equal and react to light and accomodation. The fundi are normal to examination. There is no paralysis of any of the eye muscles. There is no paralysis of any of the muscles of the limbs/

limbs.

The Heart and Lungs are normal to examination.

The patient lies on her back with the legs drawn up and is to some extent collapsed.

There is slight distention of the abdomen and great tenderness on palpation. The tenderness is more marked below the umbilicus and is more on the left side than the right.

On the left side just above Poupart's ligament there is a hard mass about the size of an ordinary orange, fairly freely movable and a little irregular in shape.

Per vaginam this swelling can be distinctly felt, it presses the uterus down so that the cervix is felt just inside the vaginal orifice. The swelling can also be felt distinctly through the rectum and is evidently a very large scyballous mass.

TREATMENT. Patient was put on milk diet and given Pot. Iod. gr. X and Magn. Sulph. gr. XXX thrice daily. An oil enema was at once given and the bowels acted freely, but it was a week before the whole of the scyballous collection was got rid of. Patient rapidly improved. There was no vomiting after admission: the anæmia diminished. The jaundice which was slight disappeared in about ten days and at the end of a month the patient left the/

the Hospital well.

For three weeks after admission the urine contained a cloud of albumin and there were a few hyaline casts. By the time the patient left the Hospital the urine was free from albumin.

CASE IV. E. S. Age 34. Married.

Admitted to the General Hospital, Nottingham.

7th June 1904, in a semi-conscious condition.

PREVIOUS HEALTH. Whooping cough at the age of 10,

after this always suffered from squint in the right eye. For the last three years she has suffered from bronchitis off and on. Otherwise she has always been strong and healthy.

Has two children, in good health. No history of any miscarriages.

FAMILY HEALTH. Nothing of importance.

PRESENT ILLNESS. Three months before admission she

missed one period, thought she was pregnant.

Bought three pennyworth of diachylon from a chemist, made it into about 100 pills herself and took four daily for a fortnight. A neighbour told her about diachylon and its properties. After taking the pills for a week she began to suffer from/

from severe griping pains especially in the lower half of the abdomen. At the same time she began to vomit, everything taken being quickly returned, at first the vomit consisted of food, very little altered, then it became dark green. Shortly after the vomiting commenced there was diarrhoea, the bowels being opened five or six times daily and the motions were loose. After taking the pills for a fortnight patient had a bloody discharge for a week and with it there was a "solid substance."

PRESENT STATE. Patient is pale, thin and anaemic, the complexion has a slightly yellowish tinge, the conjunctivae are clear and she looks considerably older than she is. She has a vacant look, is only half conscious, mutters to herself but can be roused; when asked if she has pain, nods her head and points to the abdomen. Frequently vomits and passes the urine and faeces under her. There is a good deal of fine tremor of the hands, lips and tongue. No paralysis of any of the muscles of the limbs made out. Pupils are equal, medium in size, react to light and accommodation. The margins of the discs are swollen and ill-defined; the discs are red: the veins are distended and dark/

dark and there is a small recent haemorrhage just outside the right disc on a level with its middle.

There is paralysis of the right external rectus muscle, but no other ocular paralysis.

Pulse 94, regular, volume fair, tension moderate.

The Heart and Lungs are normal to examination.

The tongue is dry and furred. Teeth are bad.

In the margins of the gums there is a very distinct blue black line.

Abdomen retracted and patient cries out whenever it is touched. Nothing abnormal felt in the abdomen.

TREATMENT. Patient was given an ounce of Magn.

Sulph. after admission, but it was thought inadvisable to give her Pot. Iodid. as she was becoming more and more restless. The first night she was in Hospital Pot. Brom.gr. XXX and Chloral Hydrat. gr. XV. were given, she had a fairly quiet night, but next day she became more restless and began to have delusions that people were chasing^{her,} trying to kill her "on account of her sins." At this time she could easily be restrained. Large doses of bromide and chloral were given, but she did not improve; after being five days in the Hospital, she became very delirious, /

delirious, constantly screaming and trying to get out of bed and disturbing the other patients, so much that she had to be removed to the City Asylum where she remained for six weeks, then was discharged sane. The maniacal condition soon subsided and was followed by depression.

Six weeks after leaving the Asylum I again examined the woman: she was considerably stouter than she was when in the Hospital. The limbs were normal to examination.

The paralysis of the external rectus was as before. Nothing abnormal was made out in the Heart, Lungs or Abdomen.

The line in the gums had almost disappeared. Her memory is very poor both for recent events and those of older standing. She remembers nothing of being in the Hospital.

With the right eye she is unable to distinguish light from darkness.

With the left she cannot see to read even large print and any object she does see is always indistinct and "misty."

Fundi. Both show marked optic atrophy, the condition being more marked in the right than in the left. In the right retina there are the remains of the haemorrhage.

While in the Hospital the urine contained a trace of albumin and a few granular cases. The urine is now free from albumin and casts.

CASE V. E. B. Age 38. Married.

Admitted to the General Hospital, Nottingham,
3rd May 1907, complaining of pain in the
"bowels" and in the bottom of the back,
constipation and vomiting.

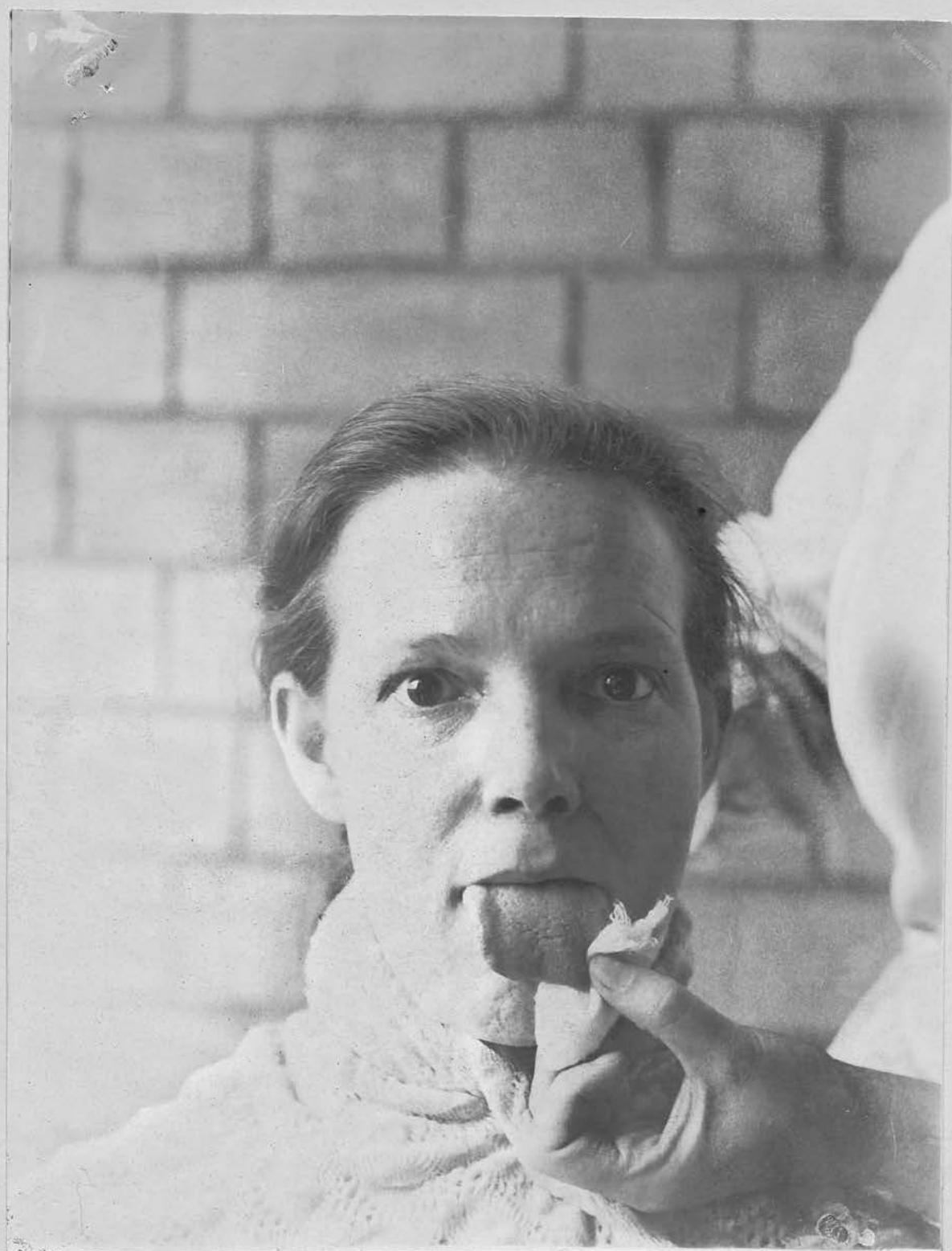
PREVIOUS HEALTH. No history of any illness.

Always been very healthy. Has three children,
all alive, last born two years ago.

FAMILY HEALTH. Nothing of importance.

PRESENT ILLNESS. Began six weeks before admission
with violent, griping pains around the umbilicus
and constipation, followed after about a week by
vomiting; the vomiting at first coming on from
half an hour to an hour after food, but after
about ten days the vomiting came on immediately
after food, even milk being returned. About
five weeks before admission patient had a mis-
carriage at the 6th week, since then has
suffered from pain in the lower part of the back.
Seven weeks before admission patient having
missed a period bought a "pennyworth of diachylon"
half of which she took in the form of pills which
she made herself.

PRESENT STATE. Patient is very pale with a faint
yellowish tinge, is moderately well nourished, is
dull/



dull and listless.

The pupils are equal, react to light and accomodation. The fundi are perfectly normal. There is no paralysis of any of the ocular muscles, nor of any of the muscles of the limbs. There is a good deal of fine tremor of the lips, tongue and hands.

The tongue is slightly furred and in the right border there are several blue black dots. In the margins of the gums there is a well marked blue black line.

(THE PHOTOGRAPH is intended to show the dots in the right border of the tongue.)

Pulse 96, regular, volume fair, tension moderate. Heart and Lungs are normal to examination.

The Abdomen is retracted and moves little with respiration. There is a good deal of tenderness on palpation, the tenderness being more marked in the lower half of the abdomen.

TREATMENT. Patient was put on low diet and given Pot. Iod. gr. X. with Magn. Sulph. gr. XXX thrice daily and very soon improved. The vomiting soon stopped and the bowels were well opened. The colour improved and patient left the Hospital at the end of three weeks quite well. There was never/

never any albumin in the urine.

This is the only case I have seen where there were the blue black dots in the tongue.

CASE VI. E. T. Age 34. Married.

Admitted to the General Hospital, Nottingham, 30th January 1907, complaining of severe pain in the lower part of the body.

PREVIOUS HEALTH. Always been good. No history of any illness. Has two children, the second born three years ago.

FAMILY HEALTH. Nothing of importance.

PRESENT ILLNESS. Patient was admitted about 11 p.m.

At 6 p.m. while sitting in a chair, she was seized with sudden sharp pain in the lower part of the abdomen on the right side, and a feeling of sickness, vomited shortly after this, the vomit being "everything she had had for tea;" felt very ill and sent for a Doctor at once. The Doctor diagnosed a Ruptured Tubal Pregnancy and sent her into the Hospital for an operation.

Previous to the onset of the pain patient had not menstruated for seven weeks, a few hours after the onset of the pain she began to have a bloody vaginal discharge. The bowels were opened several hours before the pain came on but not since./

since.

PRESENT STATE. Patient is poorly nourished, very pale and anaemic with a slight yellowish tinge, restless and very anxious about her condition. Pupils equal and react to light and accommodation. Pulse 98, regular, volume small, tension fairly high.

Tongue dry, slightly furred. Teeth bad. Along the margins of the gums there is a faint blue black line.

Heart and Lungs normal to examination. The Abdomen moves little with respiration, is slightly retracted and tender over the lower half, more particularly on the right side but nothing abnormal could be felt.

Per Vaginem. The os is somewhat patulous and the cervix somewhat softened. The right lateral fornix is very tender on examination, but beyond this nothing definitely abnormal is felt. Uterus could not be felt to be enlarged.

On the night of admission, patient denied having taken any lead.

It was decided to leave her till next day as it seemed fairly certain that she had lead poisoning and there was some doubt as to what the other condition/

condition was.

Next morning the pulse was 94 and not so small as before.

it was^ General condition improved. Had not been sick. Complained less of pain. Bowels had been fairly well opened by an enema.

On being questioned again about lead she admitted that she had taken the greater part of a penny-worth of diachylon about ten days before admission and had suffered from pains in the abdomen ever since, griping in character, accompanied by constipation and a feeling of sickness and frequent vomiting also severe headache. The pain she now has, she says, is different from the pain felt after taking the diachylon.

I took several blood films and they showed well marked granular degeneration of the red cells. Later on in the day patient was not so well, she began to vomit everything taken, though she was only having milk and water; the pulse became smaller: the expression became very anxious: the abdominal pain became much greater and it was decided to open the abdomen.

Chloroform was given and the abdomen was opened on the right side. A good deal of blood clot was found in the peritoneal cavity. The right/

right tube was found ruptured and bleeding and in it a tubal pregnancy, the whole thing being about the size of a hen's egg; this was removed and the abdominal wound closed. The bowels were very empty, there was no distention of them nor were they abnormally contracted. Patient went on well for six hours then began to vomit again and the pulse rate increased and there was a great deal of abdominal pain complained of, patient becoming very restless and at the same time the abdomen became distended but the distention was mainly in the upper half: a stomach tube was passed into the stomach and this removed a large quantity of flatus. Patient improved to some extent but next day vomiting again recurred: the pulse rate became faster, reaching 130 and at the same time the pulse became smaller and weaker and she became very restless and very pale. It was thought that her condition was due to haemorrhage from the stump of the tube and accordingly the abdomen was again opened, chloroform being given. It was found that there had been a little oozing but not to any great extent and everything in connection with the first operation looked perfectly healthy.

The/

The abdomen was closed up. Patient was given ^{drachms} Magn. Sulph. two Λ and this was repeated in three hours, but the bowels did not act. The vomiting continued, the pulse became faster and weaker and patient died on Feb. 3rd, four days after admission.

There did not appear to be anything wrong so far as the operation was concerned that would have caused death and one came to the conclusion that the vomiting must have been due to the lead taken.

The next case is the only case of Lead Palsy I have seen as the result of taking Diachylon and I studied it along with Dr. Scott who described it in his Thesis (3).

CASE VII. H.P. Age 31. Married.

Admitted to General Hospital, Nottingham 14th September 1901, complaining of "losing too much," "pains in the stomach," and constipation.

PREVIOUS HEALTH. Four years ago suffered from

Bronchitis, otherwise been healthy. Has had six children, the youngest five years old. Has been irregular at her periods for $4\frac{1}{2}$ years, sometimes going a month without being unwell, sometimes three/

three weeks, sometimes six. For the last four months she has had a white vaginal discharge.

FAMILY HEALTH Nothing of importance.

PRESENT ILLNESS, began seven weeks before admission with pain in the abdomen accompanied by diarrhoea. The week before the onset of the pain she had taken ten diachylon pills as she had missed two periods and she thought herself pregnant. For the last six weeks she has had a bloody vaginal discharge off and on and pain though the diarrhoea has now stopped. There has also been a good deal of vomiting, patient vomiting at least once every day and she has felt generally very weak.

PRESENT STATE. Patient is a pale thin woman with an anxious expression. There is some fine tremor of the lips, tongue and hands. Tongue clean, Teeth bad. There is a distinct blue black line in the gums at their margins.

Pupils equal and react to light and accomodation.

Fundi normal to examination.

Heart and Lungs normal to examination.

Abdomen. There is some rigidity of the abdomen and general tenderness on deep palpation.

Otherwise nothing abnormal made out.

Per Vaginum. Except for the discharge nothing abnormal/

abnormal made out.

A few days after admission patient complained of numbness in the hands and fingers, with pain in the forearms, tenderness on pressing the muscles of the forearm and over the course of the musculospiral nerve, at the same time the power of extending the fingers became less, beginning in the two middle fingers, the index fingers being more slowly and less affected.

After a few days she had typical lead palsy with almost complete paralysis of the extensors of the wrists and fingers. A week later she was unable to raise the arms from the chest and flexion of the forearms was imperfectly performed. The reaction to Faradism was lost in the extensors of the wrists and fingers, supinator longus, biceps, brachialis anticus and deltoid: diminished in supra- and infra-spinati and in flexors of forearm. To weak Galvanism all the muscles reacted. No polar changes were detected but contraction was not very active. The condition was identical on the two sides though loss of power more marked on left side. Wasting occurred in the muscles but was not extreme. No sensory disturbances were noted other than those mentioned above/

above.

TREATMENT consisted of massage and Galvanism to the muscles with Iod. of Potass. and Magn. Sulph. internally. Improvement was slow and was first manifested in the upper arm muscles.

Patient was discharged at the end of seven weeks. During this time she had gained a stone in weight, was much improved in general health and was now free from abdominal pain. There was still considerable weakness of the wrists and fingers for which she attended as an Out-Patient. Five months after leaving the Hospital there was little change in the muscular weakness.

The urine was free from albumin throughout. There was a good deal of general weakness of the muscles of the legs and the knee jerks were absent but there was no paralysis of any muscle or group of muscles and all the muscles reacted to Faradism.

A curious fact about diachylon poisoning is the variation in the time that elapses between taking of the drug and the onset of symptoms: another is the way in which the symptoms will suddenly become greatly aggravated without any apparent reason.

It/

It is well known that women in the child bearing period are more susceptible to the action of lead than other women and men. There is also a very marked difference in the susceptibility of different women.

At present I have two women attending as Out-patients, one has bronchitis, the other has a retroflexed uterus: neither has any sign of lead poisoning but in both there is a trace of a lead line opposite 1 tooth (I make it a rule to examine the gums in every female patient). When questioned about taking diachylon, one admitted taking it to produce abortion 18 months previously and the other seven months previously. In neither case did it produce abortion. In the one case the child was born at full time but died at the age of six months; in the other the woman is now $8\frac{1}{2}$ months pregnant and the foetal heart sounds are well heard. Each took the greater part of a "pennyworth" of diachylon and in neither case were any severe symptoms produced sufficient to make either give up work, slight headache in one case and indigestion in the other, being the only things complained of. Both cases showed basophilic granulations in the erythrocytes but in small numbers.

In three out of the seven cases I have reported there was albumin in the urine, this is in accordance with the proportion in which it has occurred in all the/

the cases I have seen.

The means suggested to prevent the practice of taking diachylon to produce abortion are not very satisfactory. One is to schedule diachylon and other forms of lead as poisons, another is to make lead poisoning in women a notifiable disease. I think if the latter were adopted the spread of the practice might be to a considerable extent stopped.

CONCLUSIONS.

1. That the practice of taking diachylon to produce abortion has greatly increased.
 2. That diachylon acts as an efficient abortifacient and that abortion usually precedes the more severe symptoms.
 3. That serious damage to the general health results in a great many cases and in not a few insanity is produced which is usually recovered from but usually there is some impairment of the mental faculties left.
 4. That the most common type of lead poisoning produced by diachylon is the abdominal one, next most common is lead encephalopathy, then comes the neuromuscular form and lastly the cachectic type.
 5. That basophilic granular erythrocytes are constantly found in patients suffering from diachylon poisoning and their number is an indication of the severity of the case.
 6. That a great many cases of diachylon poisoning occur without their being recognised as such.
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